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CENTRAL INTELLIGENCE AGENCY

DD/ST# 2269-65

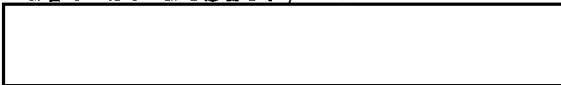
Memorandum of Conversation

ORD-1369-65

DATE: 13 May 1965

SUBJECT : Informal Meeting with ARPA, 7 May 1965  
(Micropower-Microelectronics)

PARTICIPANTS: Dr. R. L. Sproull, ARPA  
Dr. S. Koslov, ARPA



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1. This informal discussion was held for the purpose of determining the current work and interest which ARPA might have in regard to the advancement of the technology of micropower-microelectronics.

2. It was immediately determined that ARPA was not supporting any work in this area (i.e., micropower technology).

3. The ARPA people were apprised of the survey which is being carried out by AP/ORD of the industry and of the tentative conclusions reached to this time. Principally, we indicated that it was our feeling that significant technological advances could be achieved in low power semiconductor performance through the support of R&D effort in this field. The work and capability of some of the companies surveyed, such as; Texas Instruments, Inc., Motorola, Inc., CBS Laboratories, Collins Radio Company, Fairchild Semiconductor and Harry Diamond Laboratories was reviewed.

4. The situation at CBS Laboratories was discussed in the light of the fact that it is our opinion that this

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laboratory is approximately one year ahead of competing companies in the field of micropower-microelectronic R&D. However, this laboratory was just recently closed by the CBS management due to the lack of adequate contract support from Government and industry. Dr. Sproull felt that, in his estimation, it would be better to not consider the possibility of opening the CBS Laboratories by supporting work there and obtaining management approval ( [ ] effort); since there were too many semiconductor manufacturers in the country and it would be better for the industry not to reestablish another source.

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5. Data which indicated the performance of limited work carried out by a number of manufacturers in the micropower area was reviewed. The performance of a selected circuit; a 200 megacycle RF preamplifier having a 3.5 db noise figure, 20 megacycle bandwidth and 13 db of gain which operated with a power drain of only 200 microwatts, created considerable interest on the part of the ARPA people.

6. The need for micropower advancement was expressed in terms of two obvious inadequacies in current micro-electronic technology:

a. many equipment items being designed for current field use will be produced in a packaged volume considerably smaller than the associated battery or power pack required for the equipments operation.

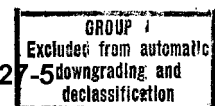
b. The density of packaging which can be accomplished through the use of current microelectronic techniques is now limited by the power dissipation requirements of the circuits.

7. Dr. Sproull expressed two reservations concerning our tentative conclusions; they dealt with: a. the theoretical maximum resistivity of the semiconductor surface treatment water, and the significance of its contribution to micropower semiconductors and, b. the anticipated life limitations of the active micropower devices. These matters were generally discussed at that time; but we felt it important to derive more detailed information about them. It has been reaffirmed, since the meeting, that these two

- 2 -

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problems do not represent a serious limitation in the pursuit of a micropower effort.

8. It was explained to Dr. Sproull and Dr. Koslov that two kinds of support was needed for this technological area - one to advance the state-of-the-art at such places as Texas Instruments and Motorola by one to two orders of magnitude (advanced development) and another more fundamental aspect - the solid state research with respect to materials, surface cleanliness and microarea techniques at such places as CBS Laboratories. It was further explained that we had a broad spectrum of immediate needs for micropower devices, that we had started with some advanced development funding, but that an expanded, but considerably more expensive, effort was required. It was emphasized that this visit was exploratory in nature, that we had more survey of industry to perform, that we had not yet proposed to our top management an overall program for consideration and funding, but were asking if ARPA would be interested in participation if and when the appropriate time came.

25X1 9. Drs. Sproull and Koslov indicated that ARPA would be very interested in pursuing a program concerned with the advanced research of technology in micropower-microelectronics. Dr. Koslov further indicated that if such a program was carried out, it could be arranged to have one of the ORD Staff act as the cognizant project officer so as to permit direct program output to be obtained by our organization. A [ ] effort was felt to be reasonable within the program plans of ARPA.

10. With respect to the advanced development programs at such places as Texas Instruments and Motorola, they would undoubtedly be happy to help if they were officially asked. In this type of program they would simply transfer funds to us and we would provide them with technological output.

11. This whole micropower area is a significant one, which would have considerable impact upon many Agency and DOD programs. Long term operation of various sensor devices without the need for replenishment of power battery supplies over extremely extended periods can be achieved. Orders of

- 3 -

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magnitude of improvement in power drain of many equipments can be achieved. To our knowledge, this area is not being pursued in a very active manner by any of the Defense Agencies or by NASA. ARPA's interest is quite high at this time, and they may proceed to consider programs in this area whether or not we request it of them.

12. The following important actions should take place as soon as possible:

- a. General Briefing of the DD/S&T
- b. Preparation within one month of a technical paper for circulation in DD/S&T, and possibly Office of Communications and DD/P/TSD.
- c. Possibly a micropower symposium.

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- 4 -

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